

New and little known species of Oncaeidae (Cyclopoida) from the Northeastern Atlantic

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Introduction

A large number of new species and genera belonging to the Oncaeidae have been described in recent years. Many common species have been re-examined and recognized as polytypic, comprising two or more varieties (Tanaka, 1960; Moulton, 1973; Ferrari, 1975; Boxshall, 1977) or two or more species (Heron, 1977). Now that some of the better known species have been redescribed in greater detail it is obvious that many of the newly described species are also in need of more exact description. Taxonomic study of oncaeids has become a very laborious process, demanding the recognition of relatively small morphological differences in these microscopic animals, half the known species of which are less than 0.6 mm in body length.

Most records of oncaeids are from the epipelagic zone, but the more recent discovery of several species extending down into the deep bathypelagic zone (below 2000 m) indicates that previous records reflect the limitations of the sampling programmes rather than any true restrictions in their depth range.

A new species, *Oncaea heronae*, and two little known species belonging to the genus *Oncaea* are here described. The genera *Conaea*, *Epicalymma* and *Myctospictosum* are synonymized with *Oncaea*. New locality records are presented for six species and two previously undescribed males and two juveniles of known species are also described.

Materials and methods

The material described below was donated to the British Museum (Natural History) by the Institute of Oceanographic Sciences (Wormley) and the Marine Biological Association (Plymouth). It was collected in April 1977 at station 9541 (20° N 21° W) in the NE Atlantic during cruise 82 of the R.R.S. *Discovery*, and in September 1979 at the mouth of the English Channel (48° N 7°30' W) during a cruise of the R.V. *Sarsia*. The *Discovery* material was collected by a 80 µ mesh diatom net attached to the RMT 1 + 8 net system. *Sarsia* material was taken using a pump system with 80 µ and 200 µ mesh filters.

Material was preserved in 10% sea water formalin, stained in chlorazol black, dissected in lactophenol and mounted in polyvinyl lactophenol. Drawings were made with the aid of a camera lucida. Specimens were measured using an eyepiece micrometer, total body length being the distance from the tip of the rostrum to the apex of the caudal rami.

Descriptions of species

Oncaea tregoubovi Shmeleva, 1968

O. tregoubovi Shmeleva, 1968 : 1784–1785, figs 1–12.

DESCRIPTION: *Female*. Ratio of prosome and urosome lengths 1.8 : 1. Prosome elongate, oval in dorsal aspect (Fig. 1a). Mean body length of 3 specimens 0.34 mm (range 0.31 to

0.37 mm). Third prosome segment without a dorsal projection. Head (first prosome division) 1.3 times longer than wide. Proportional lengths of ursome and caudal rami 8 : 57 : 5 : 4 : 13 : 13 (Fig. 1b). Genital apparatus located on dorsal surface anterior to midpoint of genital segment; each area armed with a setule. Maximum width of genital segment at level of genital apparatus; length to width ratio 1.75 : 1. Caudal rami twice as long as wide.

First antenna 6-segmented (Fig. 1c); armature: I-2, II-7, III-3, IV-3, V-2, VI-5 (some elements may be missing); ratio of segment lengths 10 : 13 : 46 : 13 : 8 : 10. Second antenna 3-segmented (Fig. 1d); first segment bearing 1 long pinnate seta distally; second segment bearing a row of denticles along internal surface; terminal segment longer than second and bearing 5 curved spines and 2 curved setae. Mandible bearing 5 elements (Fig. 1e): a stout seta on external surface, 2 broad blades, 1 bearing a row of setules along internal edge, and the other unarmed, and 2 setae, 1 long and hirsute, the other small and unarmed. First maxilla bilobed (Fig. 1f); bearing 1 seta on internal surface; 2 setae on internal lobe and 2 setae, a setose seta and a spine on external lobe. Second maxilla 2-segmented (Fig. 1g); second segment produced distally as an elongate, curved, bilaterally spinulose claw; also having an external pinnate seta and an internal bilaterally spinulose element. Maxilliped 4-segmented (Fig. 1h); first segment unarmed; internal surface of second segment with 2 spines, distal spine bidentate; third segment reduced; terminal segment produced as a long claw and armed with a row of setules on concave surface, an internal basal spine and an external basal setule.

Endopodites and exopodites of natatory legs 3-segmented (Figs 2a-d); external spines of exopodites bilaterally serrate; armature of natatory legs as follows:

	<i>Coxa</i>	<i>Basis</i>	<i>Endopodite</i>	<i>Exopodite</i>
Leg 1	0-0	1-I	0-1; 0-1; 0, I, 5	I-0; I-1; III, I, 4
Leg 2	0-0	1-0	0-1; 0-2; II, I, 3	I-0; I*-1*; III, I, 5
Leg 3	0-0	1-0	0-1; 0-2; II, I, 2	I-0; I-1; II, I, 5
Leg 4	0-0	1-0	0-1; 0-2; II, I, 1	I-0; I-1; II, I, 5

* = segment missing from figured specimen (Fig. 2b), present in other material.

Terminal spines of exopodites longer than terminal segments bearing them but terminal spines of endopodites shorter than terminal segments; each terminal spine bordered by a serrate membrane unilaterally; endopodites of legs 1-3 terminate in conical projections; all setae on legs plumose. Fifth leg comprising a small cylindrical segment bearing a single terminal seta on body surface near leg (Fig. 1i).

MATERIAL EXAMINED. 3♂♂ from sample 9541.24, 2980-3560 m. 20° N 21° W. BM(NH) 1981.114.

REMARKS. This species was identified by the following combination of characters: the relative lengths of the segments of the first and second antennae, the armature of the maxilliped and natatory legs, and the relative dimensions of the urosome segments. Some minor differences were found between the present material and the original material figured by Shmeleva (1968). Most notably Shmeleva (1968 : Fig. 9) shows the fourth natatory leg with the internal margin of the third endopodite segment unarmed, whereas the present specimens have a single seta. The absence of this seta is atypical for *Oncaea* species. It may be significant that Shmeleva does not mention this character in the text of the description, and the original drawing may be inaccurate or based on a specimen with incomplete armature. This species has only been recorded once before, from the southern Adriatic where it was taken between 200 and 300 metres depth.

Oncaea ivlevi Shmeleva, 1966

O. ivlevi Shmeleva, 1966 : 932-933, Plate I, figs 1-11.

DESCRIPTION. *Female.* Ratio of prosome and urosome lengths 1.7 : 1 (Fig. 3a). Body length of 3 specimens 0.33 mm. Third prosome segment without a dorsal projection (Fig. 3b). Head

1.1 times longer than wide. Proportional lengths of urosome segments and caudal rami 8 : 50 : 7 : 6 : 18 : 11 (Fig. 3c). Genital apparatus situated anterior to midpoint of dorsal surface of genital segment; each area armed with a setule. Maximum width of genital segment at the level of genital apparatus; length to width ratio 2 : 1. Genital segment not markedly swollen. Caudal rami nearly twice as long as wide, curving outwards and each bearing a stout spine at external corner.

First antenna armature similar to *O. tregoubovi* (Fig. 3d); ratio of segment lengths 19 : 19 : 35 : 12 : 6 : 9. Second antenna armature similar to *O. tregoubovi* except that first segment armed with a row of setules on internal surface, and second segment with a row of spinules; terminal segment equal in length to second segment (Fig. 3e). Mandible and first maxilla lost during dissection. Second maxilla like that of *O. tregoubovi* (Fig. 3f). Maxilliped 4-segmented (Fig. 3g); first segment unarmed; internal surface of second segment with 2 spines, longer distal spine spinulose; second segment also bearing a row of denticles along internal surface; third segment reduced; terminal claw bearing a row of spinules along concave surface and an internal basal spine.

Armature of natatory legs similar to *O. tregoubovi* (Figs 3h–k), but terminal segment of second endopodite bearing 1 spine on external surface instead of 2; endopodites 2, 3 and 4 tipped with relatively small conical projections; terminal spines of exopodites 1 and 2 slightly longer than terminal segments; those of exopodites 3 and 4 slightly shorter; all terminal spines of endopodites shorter than terminal segments and bilaterally flanged. Fifth leg comprising a small cylindrical free segment bearing 2 setae, outer double length of inner; and a seta on body surface near the leg.

Male. Ratio of prosome and urosome lengths 1.6 : 1 (Fig 4a and b). Mean body length of 6 specimens 0.33 mm (range 0.28 to 0.35 mm). Head 1.1 times longer than wide. Proportional lengths of urosome segments and caudal rami 7 : 60 : 2 : 3 : 2 : 13 : 13. Genital lappets produced into small postero-lateral processes (Fig. 4c). Genital segment with length to width ratio 2.1 : 1. Caudal rami twice as long as wide, as in female possessing a stout spine on each ramus.

Mouthparts similar to those of female except first antenna and maxilliped. Three distal segments of the first antenna fused. Maxilliped 3-segmented (Fig. 4d); first segment unarmed; second segment bearing 2 short spines and a row of setules on internal surface; terminal claw bearing spinules on concave surface and a stout external basal spine. Legs 1–5 similar to those of female.

MATERIAL EXAMINED. 3♀♀ and 6♂♂ from sample F166–F170, 80–40 m, 48° N 7°30' W. BM (NH) ♀♀ 1981.115–116, ♂♂ 1981.117–119 and 1981.124.

REMARKS. This species was identified by the following combination of characters: the armature of the natatory legs, the relative dimensions of the urosome segments, and the presence of the stout caudal spine. The present specimens differ from Shmeleva's descriptions in a few minor details: in the possession of 3 terminal setae in association with the spine on the caudal rami rather than 2, the possession of an extra row of spinules on both the distal spine of the second segment of the female maxilliped and the terminal claw. There are also small differences in the lengths of the terminal exopodite spines. This species has also been recorded from the southern Adriatic where it was taken between 50 and 100 metres depth (Shmeleva, 1966) and from the Atlantic at 15 stations from 9° S 25° W to 9° S 45° W between 10 and 2000 metres depth (Shmeleva, 1969).

Oncaea hispida (Heron, 1977) Comb. nov.

Conaea hispida Heron, 1977 : 90–95, Figs 33h–j, 34a–k.

DESCRIPTION. *Female*. Ratio of prosome and urosome lengths 1.75 : 1 (Fig. 5a). Body length of 1 specimen 0.56 mm. Third prosome segment without dorsal projection. Proportional lengths of urosome segments and caudal rami 8 : 48 : 7 : 7 : 18 : 12 (Fig. 5b). Genital apparatus located on dorsal surface anterior to midpoint of genital segment, each area armed

with a setule. Maximum width of genital segment at level of genital apparatus; length to width ratio 1.6 : 1. Caudal rami 1.3 times as long as wide. Appendages similar to those described by Heron with only minor differences apparent (Figs 5c–h and 6a–d).

Male. Ratio of prosome and urosome lengths 2 : 1 (Fig. 6e). Body length of 1 specimen 0.55 mm. Head 1.2 times longer than wide. Proportional lengths of urosome segments and caudal rami 10 : 51 : 3 : 3 : 3 : 18 : 12 (Fig. 6f). Genital lappets produced into small posterior processes. Genital segment with length to width ratio 1.5 : 1. Caudal rami approximately as long as wide.

Mouthparts similar to those of female except first antenna and maxilliped. The 3 distal segments of first antenna fused. Maxilliped 3-segmented (Fig. 6g); first segment unarmed; second segment bearing 2 rows of dentiform processes on internal surface; terminal claw unarmed. Legs 1–5 similar to those of female.

Fifth Copepodid (female). Ratio of prosome and urosome lengths 2 : 1 (Fig. 6h). Body length of 1 specimen 0.46 mm. Head approximately as long as wide. Urosome 4-segmented (Fig. 6h). Proportional lengths of urosome segments and caudal rami 10 : 45 : 6 : 29 : 10. Genital segment without visible genital apparatus, length to width ratio 1.5 : 1. Caudal rami 1.2 times as long as wide. Appendages similar to those of adult female except that proximal seta on second segment of juvenile maxilliped is pinnate (Fig. 6j).

MATERIAL EXAMINED. 1♀, 1♂, 1♀ juvenile from sample 9541.24, 3980–3960 m, 20° N 21° W. BM(NH) 1981.120–122.

REMARKS. This species is here transferred from the genus *Conaea* to *Oncaea* (for discussion see page 191), and was identified by the following combination of characters: the length of the terminal segment of the second antenna and its armature, the armature of the maxilliped and the length of the third segment of the fourth endopodite. There are minor differences between the present material and Heron's description of the female in the ratio of urosome segment lengths, in the proximal spine of the second segment of the maxilliped which lacks the spinules in the adult female (but not in the juvenile), and the fifth leg has 2, rather than 1, tubercles each bearing at seta. These differences are considered to represent geographical variation within the species, as the only previous records of this species are from the antarctic zone of the southwest Pacific between 1000 and 2000 metres depth. The male and fifth copepodid have not previously been described.

Oncaea heronae sp. nov.

DESCRIPTION. *Female.* Ratio of prosome and urosome lengths 1.5 : 1. Prosome elongate and oval in dorsal aspect (Fig. 7a). Mean body length of 4 specimens 0.33 mm (range 0.31 to 0.35 mm). Third prosome segment without a dorsal projection. Head 1.1 times longer than wide. Proportional lengths of urosome segments and caudal rami 9 : 50 : 7 : 7 : 13 : 14 (Fig. 7b). Genital apparatus located on dorsal surface anterior to midpoint of genital segment. Maximum width of genital segment at level of genital apparatus; length to width ratio 1.2 : 1. Caudal rami twice as long as wide.

First antenna 6-segmented (Fig. 7c); armature: I–3, II–6, III–3, IV–1, V–2, VI–5 (some elements may be missing); ratio of segment lengths 12 : 22 : 34 : 13 : 7 : 12. Second antenna 3-segmented (Fig. 7d); first segment bearing 1 long pinnate seta distally; second segment unarmed; terminal segment equal to second segment in length, bearing 1 curved spine and 3 curved setae proximally and 5 curved spines and 1 curved seta distally. Mandible lost during dissection. First maxilla (Fig. 7e) and second maxilla (Fig. 7f) with armature similar to *O. tregoubovi*. Internal surface of second segment of maxilliped bearing 2 overlapping rows of setules and 2 spines; larger distal spine bilaterally dentate (Fig. 7g); terminal claw with smooth concave surface; single internal basal spine.

Armature of natatory legs similar to *O. tregoubovi* except for armature of terminal segments of endopodites 2–4:

	<i>Coxa</i>	<i>Basis</i>	<i>Endopodite</i>	<i>Exopodite</i>
Leg 1	0-0	1-1	0-1; 0-1; 0, 1, 5	1-0; 1-1; III, 1, 4
Leg 2	0-0	?-0	0-1; 0-2; 1, 1, 3	1-0; 1-1; III, 1, 5
Leg 3	0-0	1-0	0-1; 0-2; 0, 1, 2	1-0; 1-1; II, 1, 5
Leg 4	0-0	?-0	0-1; 0-2; 0, 1, 1	1-0; 1-1; II, 1, 5

Bilaterally serrate spines on external margins of exopodites lack pronounced flanges (Figs 7h-k); first endopodite with conical terminal projection; all terminal spines shorter than terminal segments except terminal spines of fourth exopodite and endopodite, these being longer than terminal segments. Fifth leg comprising small free cylindrical segment bearing 2 terminal setae, the longer, internal seta extending to level of genital apertures.

Male. Not known.

MATERIAL EXAMINED. 4♀♀ from sample 9541.24, 3980-3960 m, 20° N 21° W. BM(NH) Holotype 1981.125, paratypes 1981.126.

ETYMOLOGY. This species has been named after Gayle A. Heron of the University of Washington, Seattle, in recognition of her work on the taxonomy of the Oncaeidae.

REMARKS. The second, third and fourth endopodites of *O. heronae*, *O. brodskii* Shmeleva, 1968 and *O. longipes* Shmeleva, 1968 have the same unusual armature described above, but *O. heronae* can be distinguished by other small differences in the armature of the natatory legs, by the 2 overlapping rows of setules on the second segment of the maxilliped, and by the structure of the free segment of the fifth leg which is elongate in *O. longipes* and reduced to a tubercle in *O. brodskii*, but small and delimited from the body segment in *O. heronae*.

Oncaea setosa Heron, 1977

O. setosa Heron, 1977 : 73, figs 22a-h.

DESCRIPTION. *Female*. Mean body length of 4 specimens 0.5 mm (range 0.42 to 0.58 mm). Body figured (Figs 8a-c). Appendages of *O. setosa* similar to those described by Heron with only minor differences apparent (Figs 8d-n).

Male. Ratio of prosome and urosome lengths 1.5 : 1 (Figs 9a and b). Body length of 1 specimen 0.58 mm. Head 1.2 times longer than wide. Proportional lengths of urosome segments and caudal rami 12 : 47 : 3 : 3 : 3 : 18 : 14 (Fig. 9c). Genital lappets extending postero-laterally into acute points.

Mouthparts like those of female, except first antenna and maxilliped. First antenna 4-segmented (Fig. 9d). Maxilliped 3-segmented (Fig. 9e); second segment bearing 2 spines on internal surface and 3 groups of setules; terminal claw bearing a stout internal basal spine.

First and second natatory legs like those of female, but terminal spines of third and fourth exopodites longer than those of female, being respectively 1.5 times and twice the length of terminal segments. Two spines, representing the fifth leg, borne on tubercle not clearly delimited from body.

Fifth Copepodid (female). Ratio of prosome and urosome lengths 3 : 1 (Figs 9f and g). Body length of 1 specimen 0.51 mm. Head 1.2 times longer than wide. Urosome 4-segmented (Fig. 9h). Proportional lengths of urosome segments and caudal rami 12 : 40 : 8 : 24 : 16. Mouthparts similar to those of adult female except maxilliped, bearing a group of setules on internal surface of second segment (Fig. 9i). Natatory legs bearing terminal spines proportionally longer than those of adult female (Figs 9j and k, 10a and b). (10j and k, 11a and b).

MATERIAL EXAMINED. 4♀♀ (1 lost), 1♂, 1♀ juvenile from sample 9541.24, 3980-3960 m, 20° N 21° W. BM(NH) 1981.127-129.

REMARKS. This species was identified by the cluster of spinules on the second segment of the second antenna, the armature of the maxilliped and the relative dimensions of the urosome segments. The female differs from Heron's description in some minor details: the terminal

spines of the third and fourth endopodites are longer in proportion to their terminal segments in the present material. The male and the fifth copepodid have not previously been described. Heron reported *O. setosa* from 2 stations in the antarctic zone of the southwest Pacific between 1000 and 2000 metres depth.

***Oncaea rotunda* Heron, 1977**

O. rotunda Heron, 1977: 77–79, figs 24o–q, 25a–m.

DESCRIPTION. *Female*. body length of 1 specimen 0.55 mm. Body (Figs 10c–e) and second antenna (Fig. 10f) figured.

MATERIAL EXAMINED. 1♀ from sample 9541.24. 3980–3960 m, 20° N 21° W. BM(NH) 1981.130.

REMARKS. This specimen was assigned to *O. rotunda* because of its distinctive second antenna, which has a very short terminal segment relative to the second segment and bears relatively short terminal spines and setae. Also the terminal segment of the fourth endopodite is reduced. Although somewhat smaller than the type material (mean length 0.74 mm), this specimen otherwise corresponds closely to Heron's description. Heron reported *O. rotunda* from 3 stations in the antarctic zone of the Pacific between 1000 and 2000 metres depth.

***Oncaea brocha* Heron, 1977**

O. brocha Heron, 1977: 60, figs 14f–n, 15a–n.

DESCRIPTION. *Female*. Body length of 2 specimens 0.81 and 0.83 mm. Urosome (Fig. 10g), second antenna (Fig. 10h), maxilliped (Fig. 10i) and second and third natatory legs (Figs 10j and k) figured.

MATERIAL EXAMINED. 2♀♀ from sample 9541.24, 3980–3960. 20° N 21° W. BM(NH) 1981.131.

REMARKS. The specimens were identified by the following combination of characters: the relative lengths of the segments of the first and second antennae, the armature of the maxilliped, of the natatory and of the fifth legs. The second antenna has an additional terminal spine not figured by Heron. This may have been lost from Heron's material or may represent geographical variation. Another minor difference observed was the length of the terminal spines of the second and third endopodites which are relatively longer in the present material. The refractive granules mentioned by Heron are absent from these specimens, but but these may have been artefacts or may represent the positions of cuticular pores. Heron reported *O. brocha* from 1 station in the antarctic zone of the southwest Pacific between 1000 and 2000 metres depth.

***Oncaea schmitti* (Heron, 1977) Comb. nov.**

Epicalymma schmitti Heron, 1977: 82–84, figs 28a–n, 29a–e.

DESCRIPTION. *Female*. Body length 2 specimens 0.33 and 0.34 mm. Body (Figs 11a and b), second antenna (Fig. 11c) and maxilliped (Fig. 11d) figured.

MATERIAL EXAMINED. 2♀♀ from sample 9541.24, 3980–3960 m. 20° N 21° W. BM(NH) 1981.132.

REMARKS. This species is here transferred from the genus *Epicalymma* to *Oncaea* (for discussion see page 191). Specimens are clearly identifiable as *O. schmitti* by the armature and relative segment lengths of the second antenna, the armature of the maxilliped and the dorsal projections of the caudal rami. However, the specimens are so thinly chitinized that the genital segment had partially collapsed during capture or preservation. Therefore, the drawing of the urosome may not represent the morphology of the living animal. This species

has also been recorded from the antarctic zone of the southwest Pacific where it was taken between 1000 and 2000 metres depth.

***Oncaea umbonata* (Heron, 1977) Comb. nov.**

Epicalymma umbonata Heron, 1977 : 84–86, figs 29f–p, 30a–c.

DESCRIPTION. *Female*. Body length of 1 damaged specimen 0.62 mm, without caudal rami. Body (Figs 11e and f), second antenna (Fig. 11g) maxilliped (Fig. 11h) figured.

MATERIAL EXAMINED. 1♀ from sample 9541.24, 3980–3960 m. 20° N 21° W. BM(NH) 1981.133.

REMARKS. This species is here transferred from the genus *Epicalymma* to *Oncaea* (for discussion see below). Although the specimen lacks its caudal rami it was assigned to *O. umbonata* on the basis of its body size and maxilliped armature. There are also differences of the armature of the second antenna between this and the specimens recorded as *O. schmitti*, the two species are otherwise very close. The natatory legs and other mouthparts correspond closely to Heron's original description. This species has also been recorded from the antarctic zone of the southwest Pacific where it was taken between 1000 and 2000 metres depth.

Phylogenetic relationships within the genus *Oncaea*

Giesbrecht (1892) designated the following character states as typical of the genus *Conaea*: the elongate terminal segment of the second antenna with very large, hook-tipped spines; endopodite of the fourth leg shorter than the exopodite, third segment is reduced (shorter than the first or second segment); the fifth leg reduced to a single plumose seta. However Heron (1977) was able to demonstrate the presence of a minute spinule accompanying the seta of the fifth leg of *O. gracilis* Dana, 1852 (= syn. *C. rapax*), the type species. Heron also described 2 new species of *Conaea*, *C. succurva* and *C. hispida*. Both of these have a seta on a small prominence representing leg 5, and a reduced endopodite of the fourth leg, but the third endopodite segment exceeds the first segment in length. These 2 species also lack the hooked tips to the terminal spines of the second antenna. *Oncaea expressa* Gordejeva, 1973 shares these and other character states but differs in the morphology of the natatory legs (Table 1). No less than 27 other species of *Oncaea* also show 1 or more of these *Conaea*-like character states (Table 2) The 2 species of *Epicalymma* which Heron (1977) described also exhibit the following character states: elongate terminal segment of the second antenna with very large hook-tipped spines, endopodite of the fourth leg shorter than the exopodite, third segment reduced (but longer than the first or second segment), fifth leg with a single terminal seta.

A continuous gradation of character states within *Oncaea*, *Conaea* and *Epicalymma* is thus becoming apparent as more species of *Oncaea* are discovered. The armature of the third exopodite segments of the swimming legs also illustrates this. Most *Oncaea* species have an external spine formula of III, III, II, II but there is considerable variation within the genus: II, III, III, I (*O. ancora* Gordejeva, 1973); III, III, III, II (*O. minor* Shmeleva, 1979 and *O. parobscura* Shmeleva, 1979); III, II, II, I (*O. expressa* Gordejeva, 1973); III, II, II, II (*O. brodskii* Shmeleva, 1968 and *O. longipes* Shmeleva, 1968); II, III, II, I (*O. exigua* Farran, 1908); II, II, I, I (*O. atlantica* Shmeleva, 1967 and *O. vodjanitskii* Shmeleva and Delalo, 1969); II, III, II, II (*O. zernovi* Shmeleva, 1966 and *O. mollicula* Gordejeva, 1975). The typical formula for *Conaea* is II, III, II, I and for *Epicalymma* II, III, III, I. Such variation represents a continuum which cannot, in my opinion, justifiably be subdivided into 2 or more genera as it is at present. It is probable that *Conaea*-like and *Epicalymma*-like character states have been derived by reduction and loss of armature elements from ancestors within the genus *Oncaea*. Separation of the *Conaea* and *Epicalymma* species would leave

Table 1 Comparison of morphology of natatory legs of *Oncaea expressa*, *O. succurva* and *O. hispida*.

	Leg 1	Leg 2	Leg 3	Leg 4
<i>O. expressa</i> Gordejeva, 1973	Exopod. spine 2 × length term. segm. Endopod. spine shorter than term. segm.	Exopod. spine 2 × length term. segm. Endopod. spine 1·5 × length term. segm.	Exopod. spine 2·5 × length term. segm. Endopod. spine > 4 × length term. segm.	Exopod. spine > 2 × length term. segm. Endopod. spine > 4 × length term. segm.
<i>O. succurva</i> (Heron, 1977) comb. nov. (syn. <i>Conaea</i> <i>succurva</i>)	Exopod. spine 2 × length term. segm. Endopod. spine same length term. segm.	Exopod. spine > 2 × length term. segm. Endopod. spine 1·5 × length term. segm.	Exopod. spine 2·5 × length term. segm. Endopod. spine 2·5 × length term. segm.	Exopod. spine > 2·5 × length term. segm. Endopod. spine 3 × length term. segm.
<i>O. hispida</i> (Heron, 1977) comb. nov. (syn <i>Conaea</i> <i>hispida</i>)	Exopod. spine 2 × length term. segm. Endopod. spine same length term. segm.	Exopod. spine > 2 × length term. segm. Endopod. spine 1·5 × length term. segm.	Exopod. spine 2·5 × length term. segm. Endopod. spine 2 × length term. segm.	Exopod. spine > 3 × length term. segm. Endopod. spine > 4 × length term. segm.

Oncaea as a paraphyletic group. In order to retain *Oncaea* as a monophyletic group (*sensu* Hennig, 1966) it is proposed that *Conaea* and *Epicalymma* be synonymized with *Oncaea* and that the species of *Conaea* and *Epicalymma* be transferred to *Oncaea*, *C. gracilis*, *C. succurva*, and *C. hispida* becoming *O. gracilis*, *O. succurva* and *O. hispida*, also *E. schmitti* and *E. umbonata* becoming *O. schmitti* and *O. umbonata* respectively.

Kazatchenko and Andreev (1977) described *Myctospictosum* as a genus of uncertain taxonomic position. A single male of *M. philippinensis* was found on the gills of *Myctophum spinosum* in the western Pacific. It is clear from the figures (Kazatchenko and Andreev, 1977 : Figs 9 and 10) that this is an oncaeid. It has the body shape, the 4-segmented first antenna and the 3-segmented second antenna of a typical *Oncaea* male. The other mouthparts have been interpreted differently by the authors but are clearly those of a male *Oncaea*. The natatory legs are also typical of the genus. It is proposed, therefore, that *Myctospictosum* should be synonymized with *Oncaea*. The armature of the natatory legs and the relative lengths of the posterior segments separate *O. philippinensis* comb. nov. from any of the known males of the genus *Oncaea*.

Oncaeids are often found clinging by their maxillipeds to other organisms and debris in plankton samples, there is, therefore, no reason to suppose that *O. philippinensis* is parasitic, it is probably a free-living planktivore like other species of the genus.

The generic diagnosis of *Oncaea* is ammended as follows:

***ONCAEA* Philippi, 1843**

Oncaea Philippi, 1843 : 63.

Antaria Dana, 1846 : 229.

Conaea Giesbrecht, 1891 : 477.

Epicalymma Heron, 1977 : 82.

Myctospictosum Kazatchenko and Andreev, 1977 : 47.

DIAGNOSIS. Cyclopoid shape. Rostral area thickened with rounded posteroventral margin. Female urosome 5-segmented, male 6-segmented. First antenna 6-segmented in female,

Table 2 *Conaea*-like character states exhibited by species of *Oncaea*.

Terminal segment of second antenna elongate	Endopod. 4 shorter than expod.	Leg 5 reduced to 1 seta, borne/not borne on a tubercle	3 of terminal setae of second antenna hook-tipped	Terminal segment of endopod. 4 shorter than first and second segments	
+	+	+	+	+	<i>O. gracilis</i> (Dana, 1852)
+	+	+	+		<i>O. schmitti</i> (Heron, 1977)
+	+	+	+		<i>O. umbonata</i> (Heron, 1977)
+	+	+			<i>O. ancora</i> Gordejeva, 1973
+	+	+			<i>O. atlantica</i> Shmeleva, 1967
+	+	+			<i>O. exigua</i> Farran, 1908
+	+	+			<i>O. expressa</i> Gordjeva, 1973
+	+	+			<i>O. hispida</i> (Heron, 1977)
+	+	+			<i>O. mollicula</i> Gordejeva, 1975
+	+	+			<i>O. succurva</i> (Heron, 1977)
+		?			<i>O. alboranica</i> Shmeleva, 1979
+		+			<i>O. prendeli</i> Shmeleva, 1966
+		+			<i>O. shmelevi</i> Gordejeva, 1972
+		+			<i>O. tenella</i> Sars, 1916
+		+			<i>O. tregoubovi</i> , Shmeleva, 1968
+	+				<i>O. brodskii</i> Shmeleva, 1968
+	+				<i>O. heronae</i> sp. nov.
+	+				<i>O. longpipes</i> Shmeleva, 1968
+	+				<i>O. memorata</i> Gordejeva, 1973
+	+				<i>O. minima</i> Shmeleva, 1968
+	+				<i>O. rotunda</i> Heron, 1977
+	+				<i>O. rotundata</i> Boxshall, 1977
+					<i>O. subtilis</i> Giesbrecht, 1892
+	+				<i>O. vodjanitskii</i> Shmeleva & Délalo, 1969
+	+				<i>O. zernovi</i> Shmeleva, 1966
		+			<i>O. ornata</i> Giesbrecht, 1891
	+				<i>O. infantula</i> Gordejeva, 1972
+					<i>O. africana</i> Shmeleva, 1979
+					<i>O. curvata</i> Giesbrecht, 1902
+					<i>O. englishi</i> Heron, 1977
+					<i>O. ivlevi</i> Shmeleva, 1966

4-segmented in male, both with long third segment. Second antenna 3-segmented, terminal segment bearing proximal group of 3 or 4 setae and a distal group of 6 to 8 setae. Mandible bearing 2 blades and 2 or 3 setae. First maxilla bilobed, inner lobe with 3 elements. Second maxilla with setose claw. Maxilliped 4-segmented in female and 3-segmented in male, second segment in female bearing 2 setae on the internal surface. Terminal segment produced as a long, curved claw. Legs 1–4 3-segmented, endopodites slender. Exopodites armed with serrate spines on external margin. Leg 5 reduced to small rod or knob-like segment fused to urosome somite and bearing 1 or 2 apical setae. Gender feminine.

TYPE SPECIES: *Oncaea vensusta* Philippi, 1843. Sixty-eight species of *Oncaea* are now known, over half of which have been described within the past 15 years (Shmeleva, 1966, 1967, 1968, 1969, 1979; Razouls, 1969; Gordejeva, 1972, 1973, 1975; Boxshall, 1977; Heron, 1977; Kazatchenko and Andreev, 1977).

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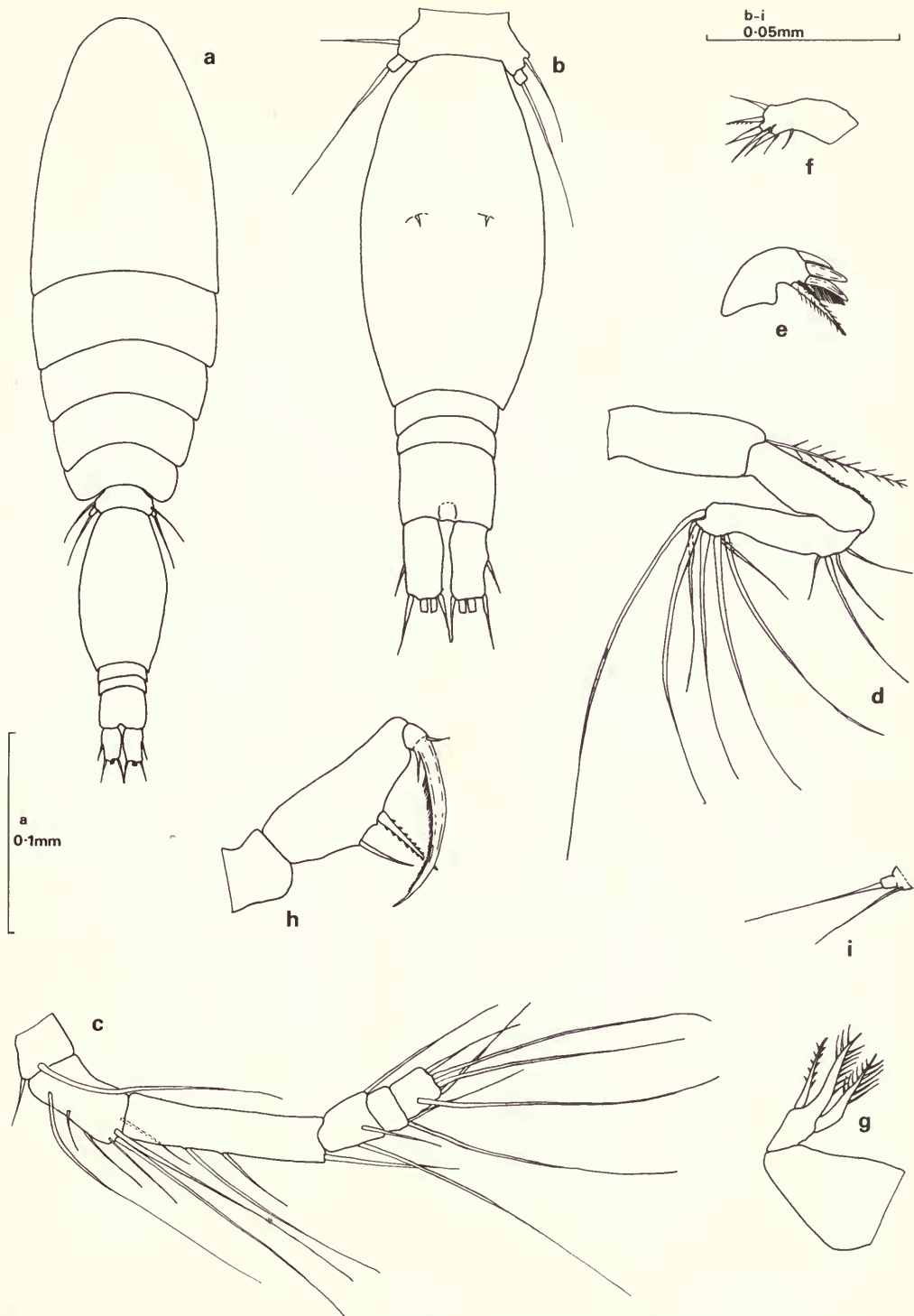
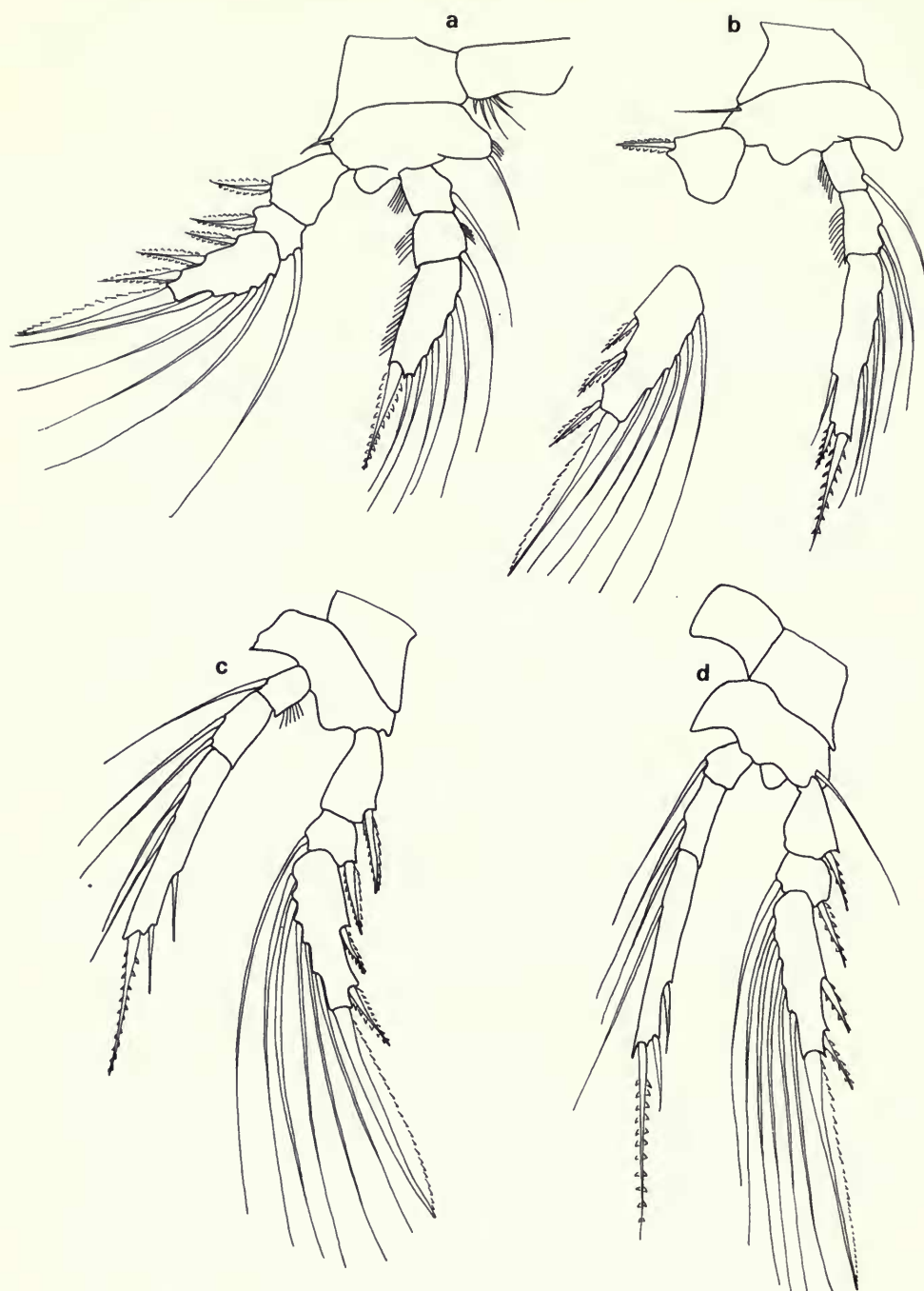


Fig. 1 *Oncaea tregoubovi*. a. female, dorsal; b. urosome, dorsal; c. first antenna; d. second antenna; e. mandible; f. first maxilla; g. second maxilla; h. maxilliped; i. fifth leg.



0.05mm
a-d

Fig. 2 *Oncaea tregoubovi*. a. female, leg 1; b. leg 2 (damaged); c. leg 3; d. leg 4.

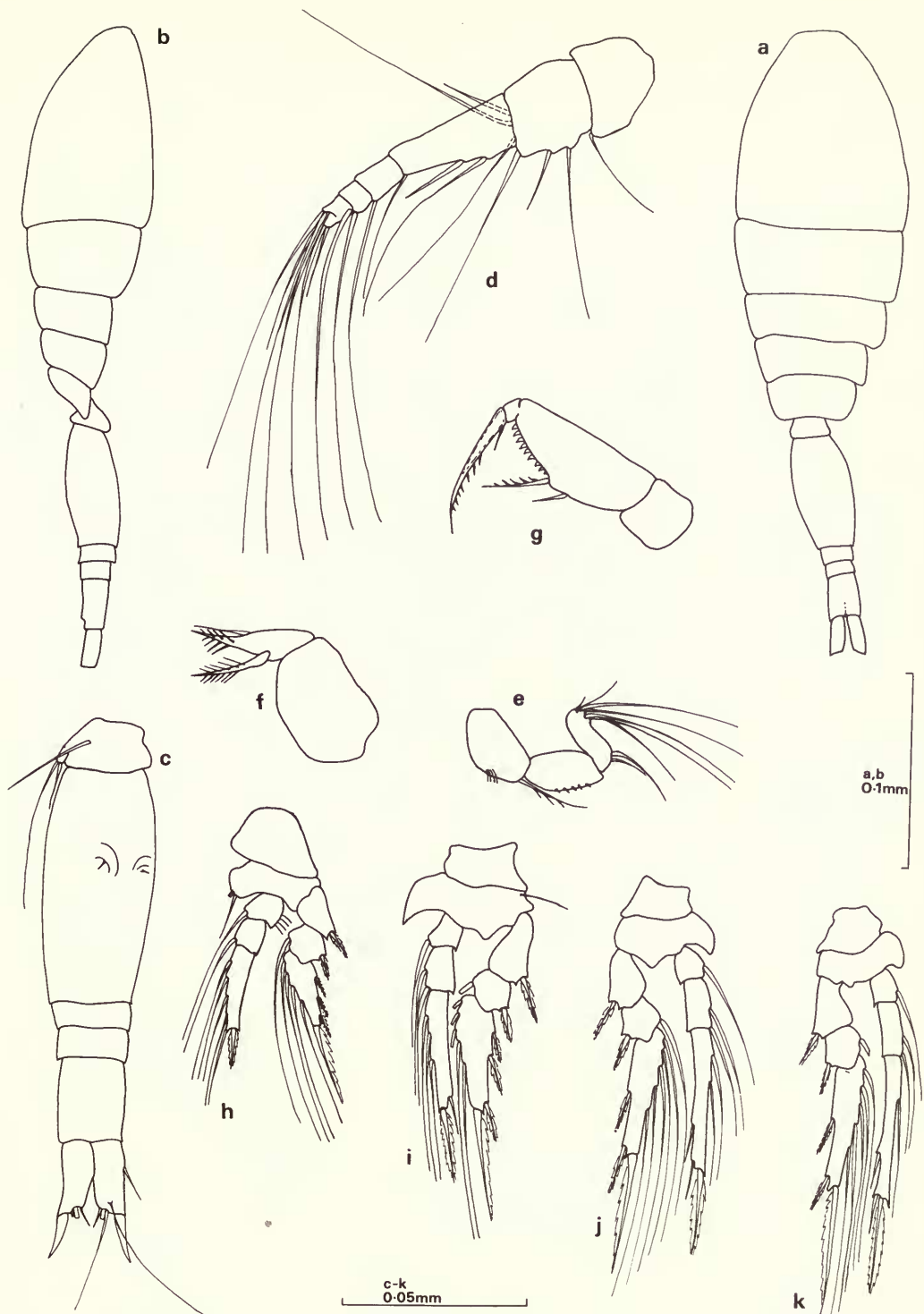


Fig. 3 *Oncaea ivlevi*. a. female, dorsal; b. female, lateral; c. urosome, dorso-lateral; d. first antenna; e. second antenna; f. second maxilla; g. maxilliped; h. leg 1; i. leg 2; j. leg 3; k. leg 4.

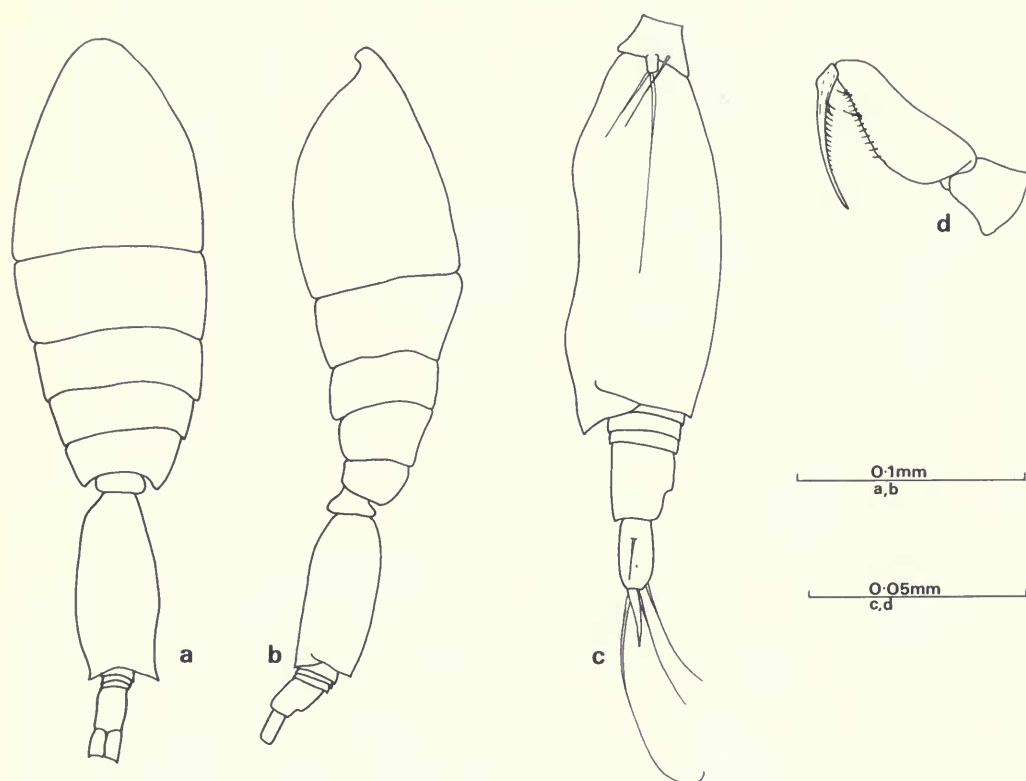


Fig. 4 *Oncaea ivlevi*. a. male, dorsal; b. male, lateral; c. urosome, lateral; d. maxilliped.

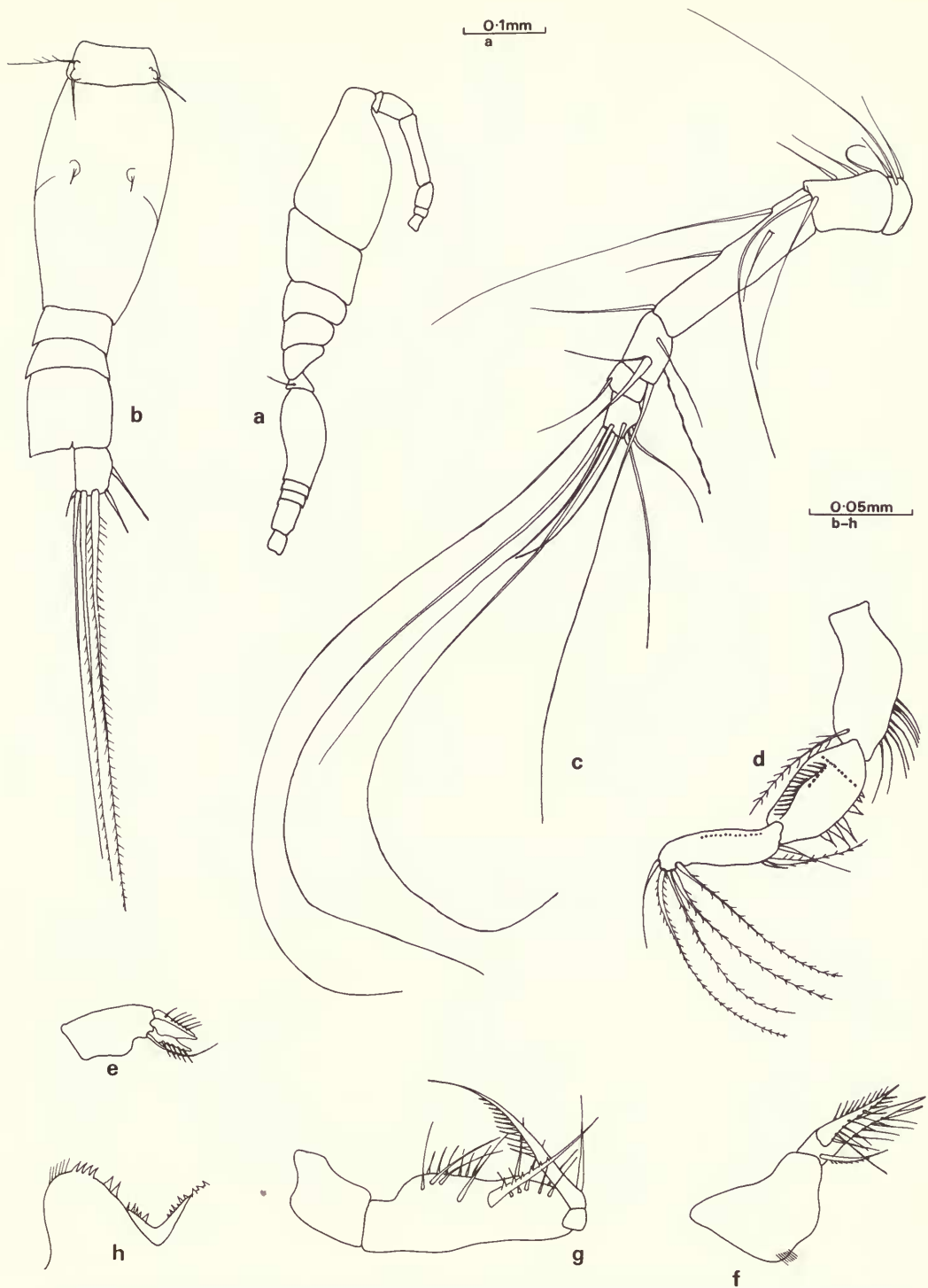


Fig. 5 *Oncaea hispida*. a. female, lateral; b. urosome, dorsal; c. first antenna; d. second antenna; e. mandible; f. second maxilla; g. maxilliped; h. labrum (lamella missing).

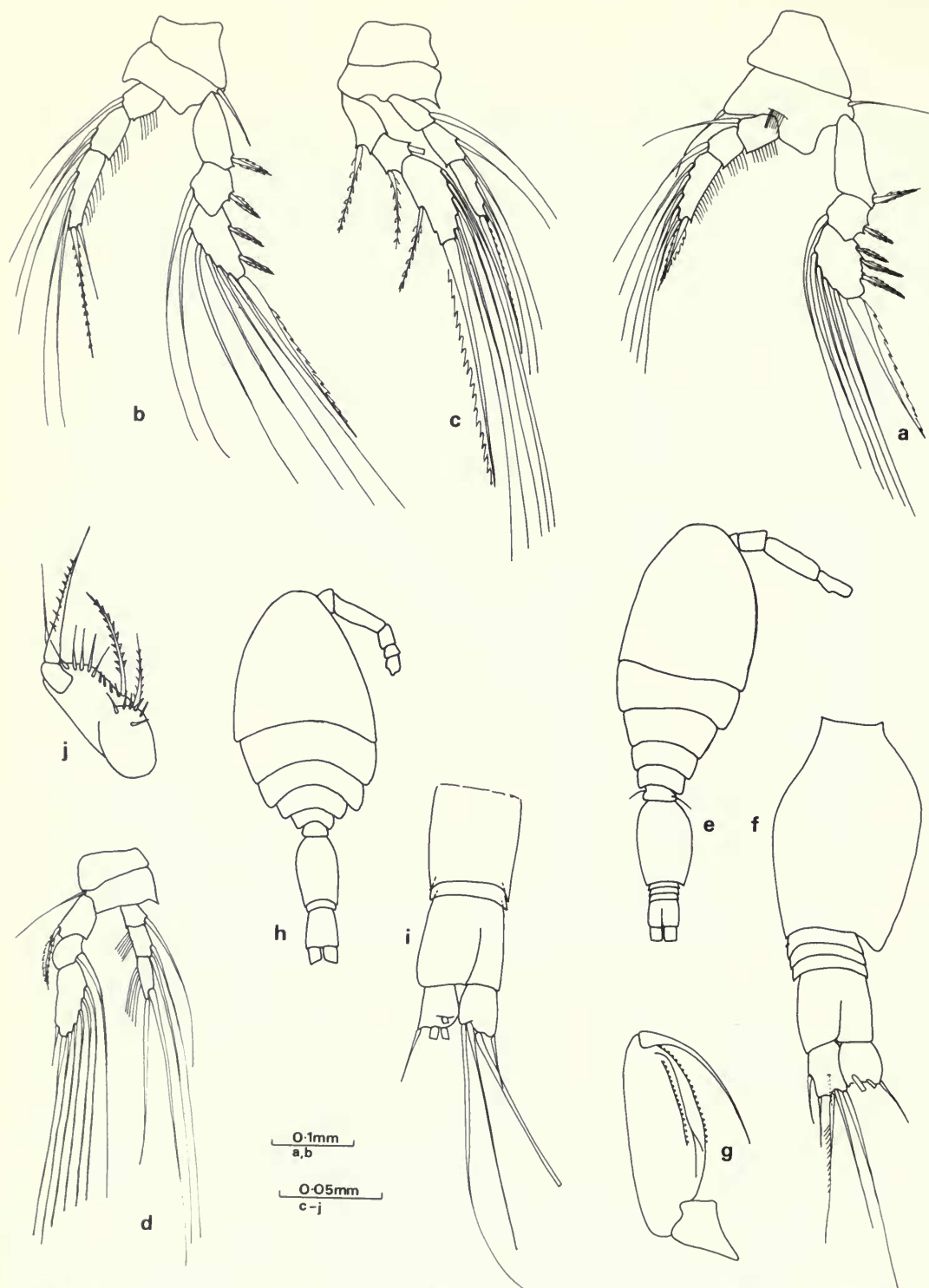


Fig. 6 *Oncaea hispida*. a. female, leg 1; b. leg 2; c. leg 3; d. leg 4; e. male dorsal; f. urosome ventral (specimen distorted); g. maxilliped; h. female copepodid V, dorsal; i. posterior segments of urosome, dorsal (only posterior half of genital segment figured); j. maxilliped.

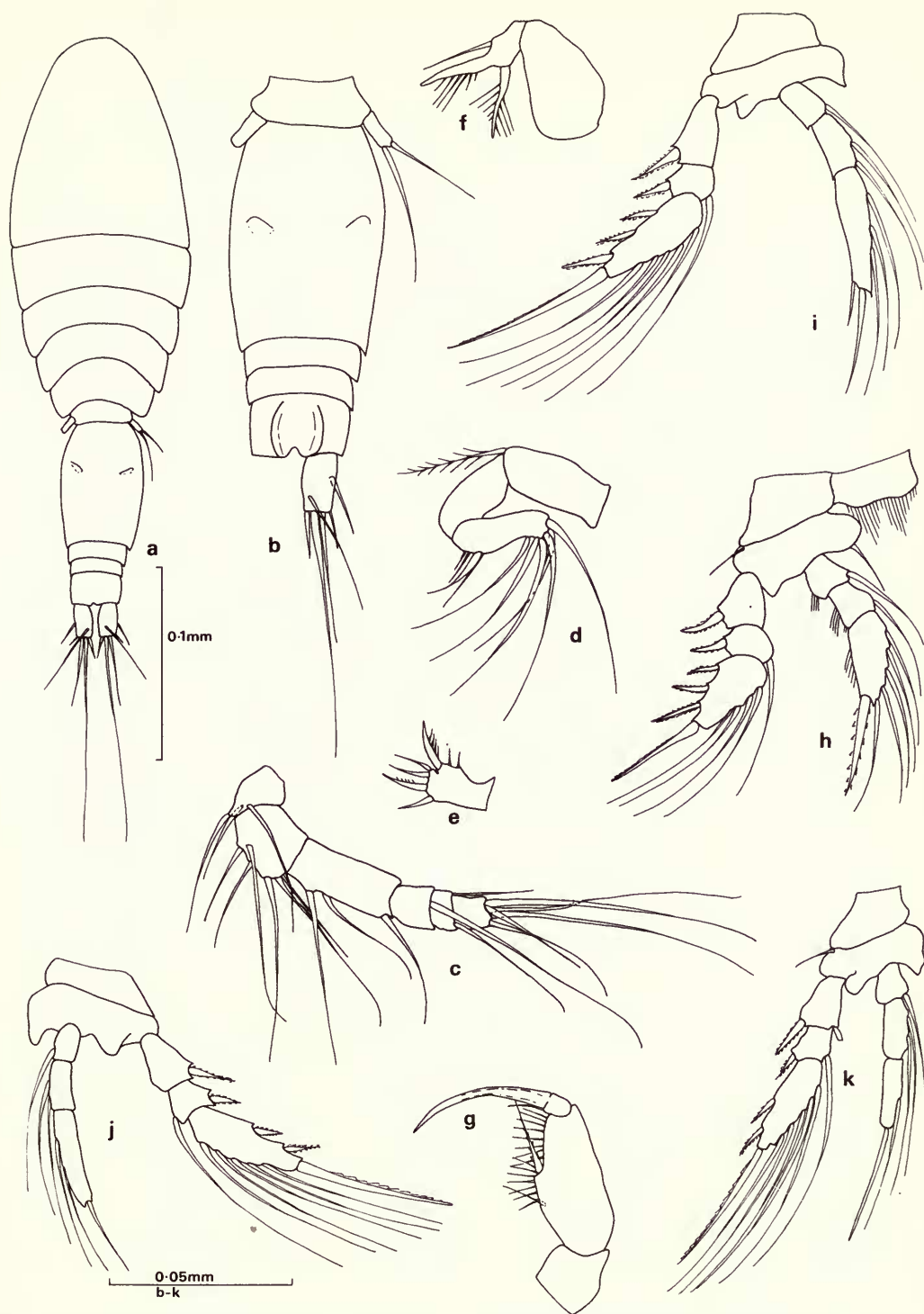


Fig. 7. *Oncaea heronae* sp. nov. a. female, dorsal; b. urosome, dorsal; c. first antenna; d. second antenna; e. first maxilla, f. second maxilla; g. maxilliped; h. leg 1; i. leg 2; j. leg 3; k. leg 4.

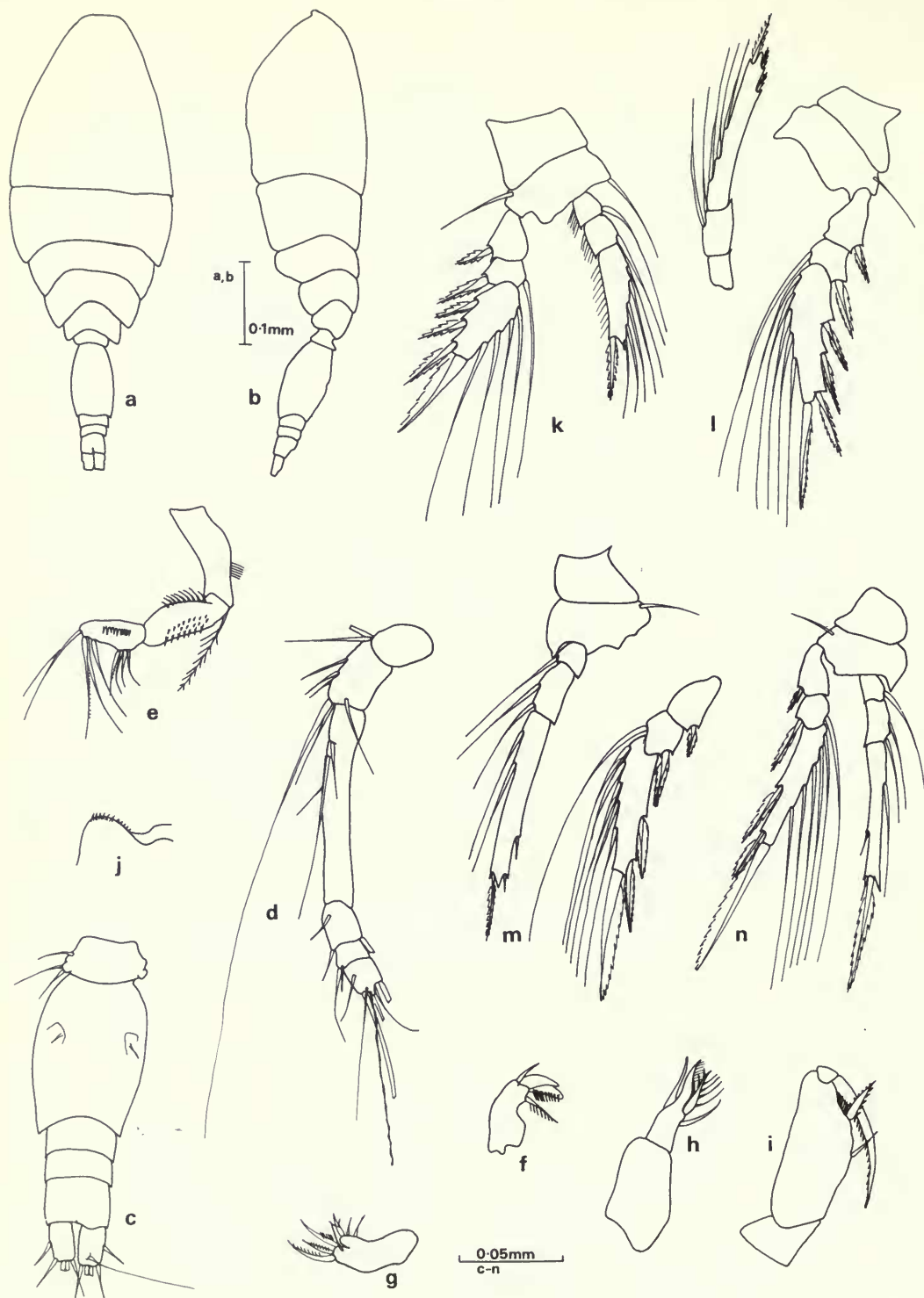


Fig. 8 *Oncaea setosa*. a. female, dorsal; b. female, lateral; c. urosome, dorsal; d. first antenna; e. second antenna; f. mandible; g. first maxilla; h. second maxilla; i. maxilliped; j. labrum (lamella missing); k. leg 1; l. leg 2; m. leg 3; n. leg 4.

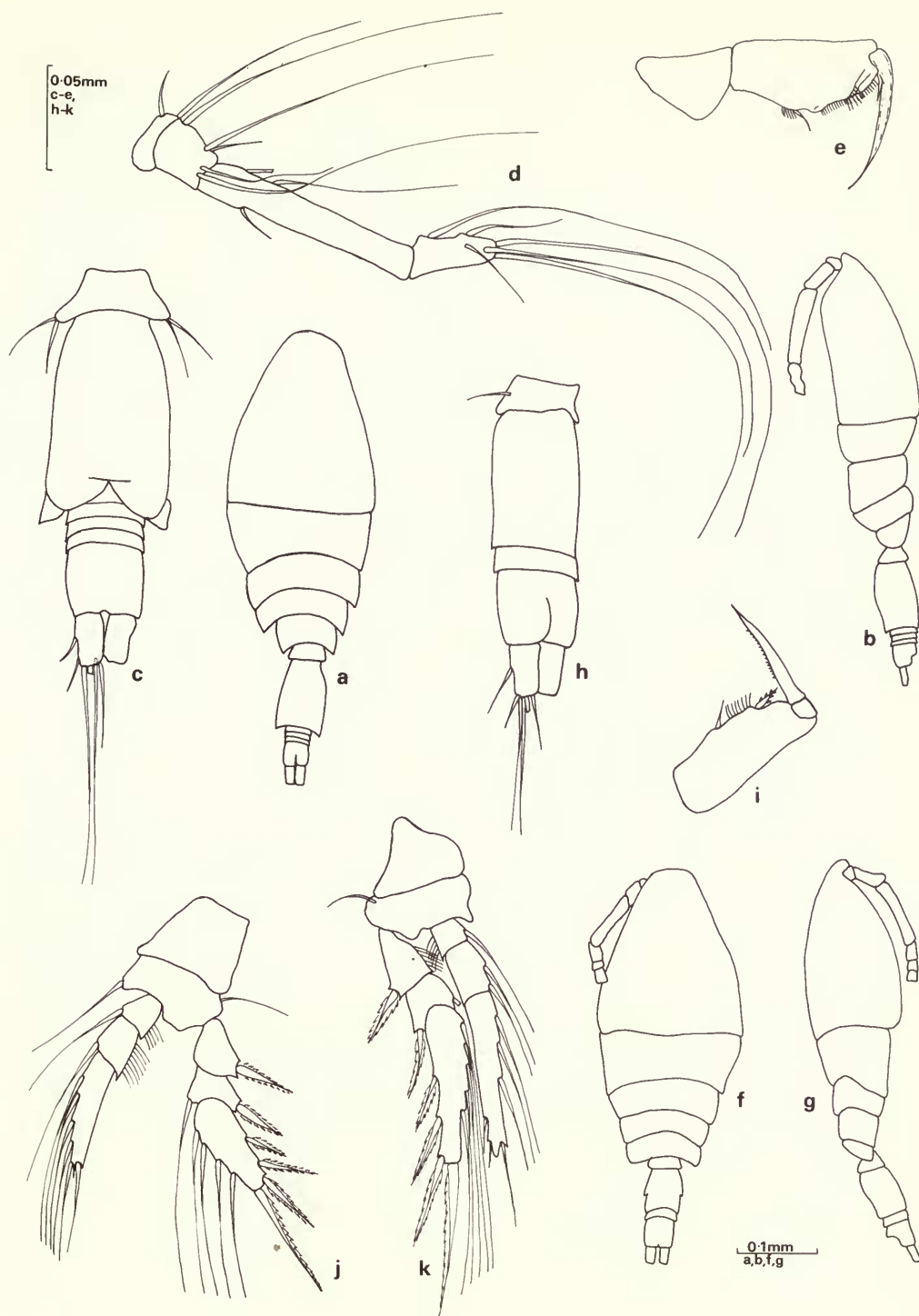


Fig. 9 *Oncaea setosa*. a. male, dorsal; b. male lateral; c. urosome, ventral; d. first antenna; e. maxilliped (distal spine missing); f. female copepodid V, dorsal; g. female copepodid V, lateral; h. urosome, dorso-lateral; i. maxilliped; j. leg 1; k. leg 2.

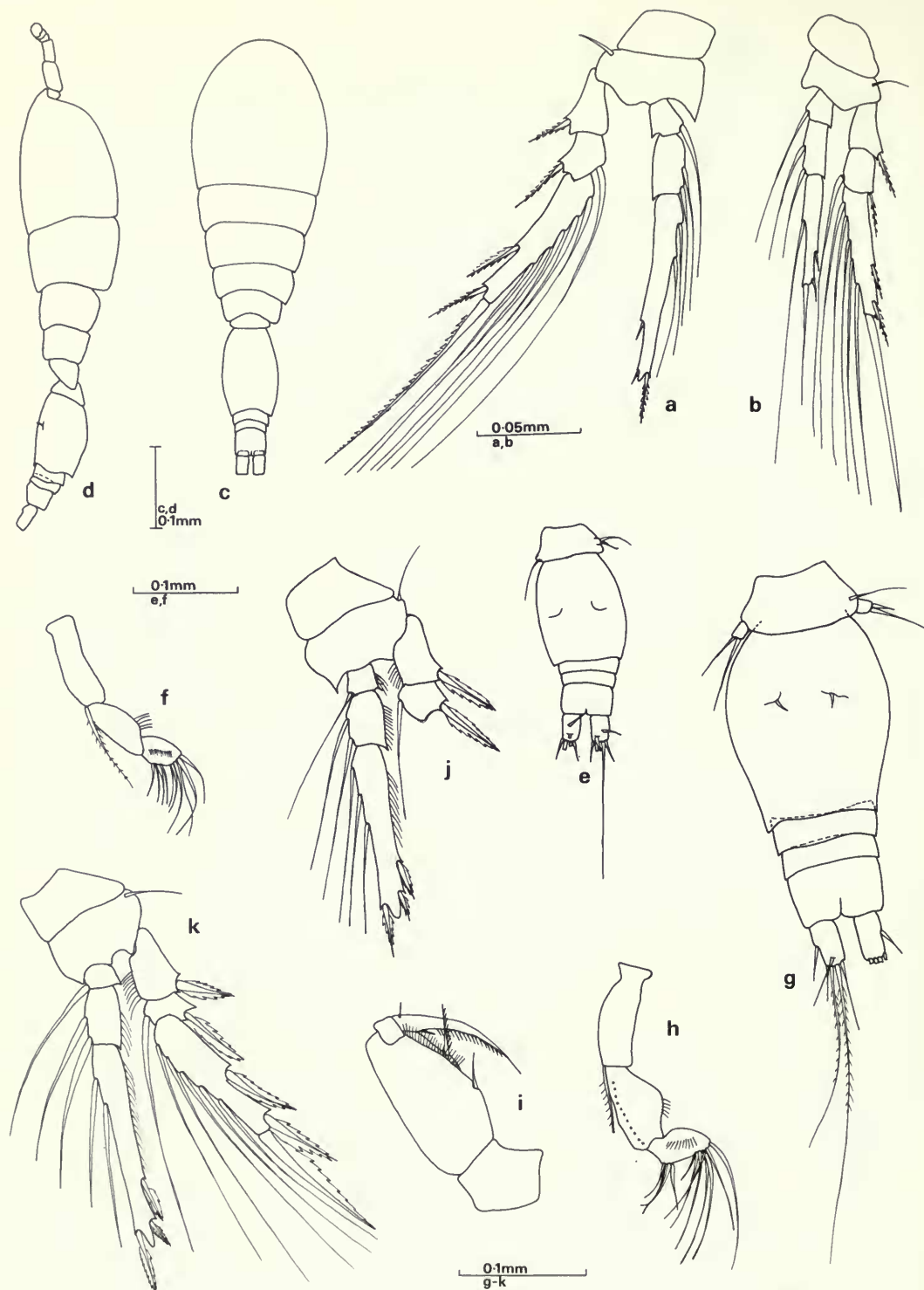


Fig 10 *Oncaea setosa*. a. female copepodid V, leg 3; b. leg 4; *Oncaea rotunda*. c. female, dorsal; d. female, lateral; e. urosome, dorsal; f. second antenna; *Oncaea brocha*. g. female urosome, dorsal; h. second antenna; i. maxilliped; j. leg 2; k. leg 3.

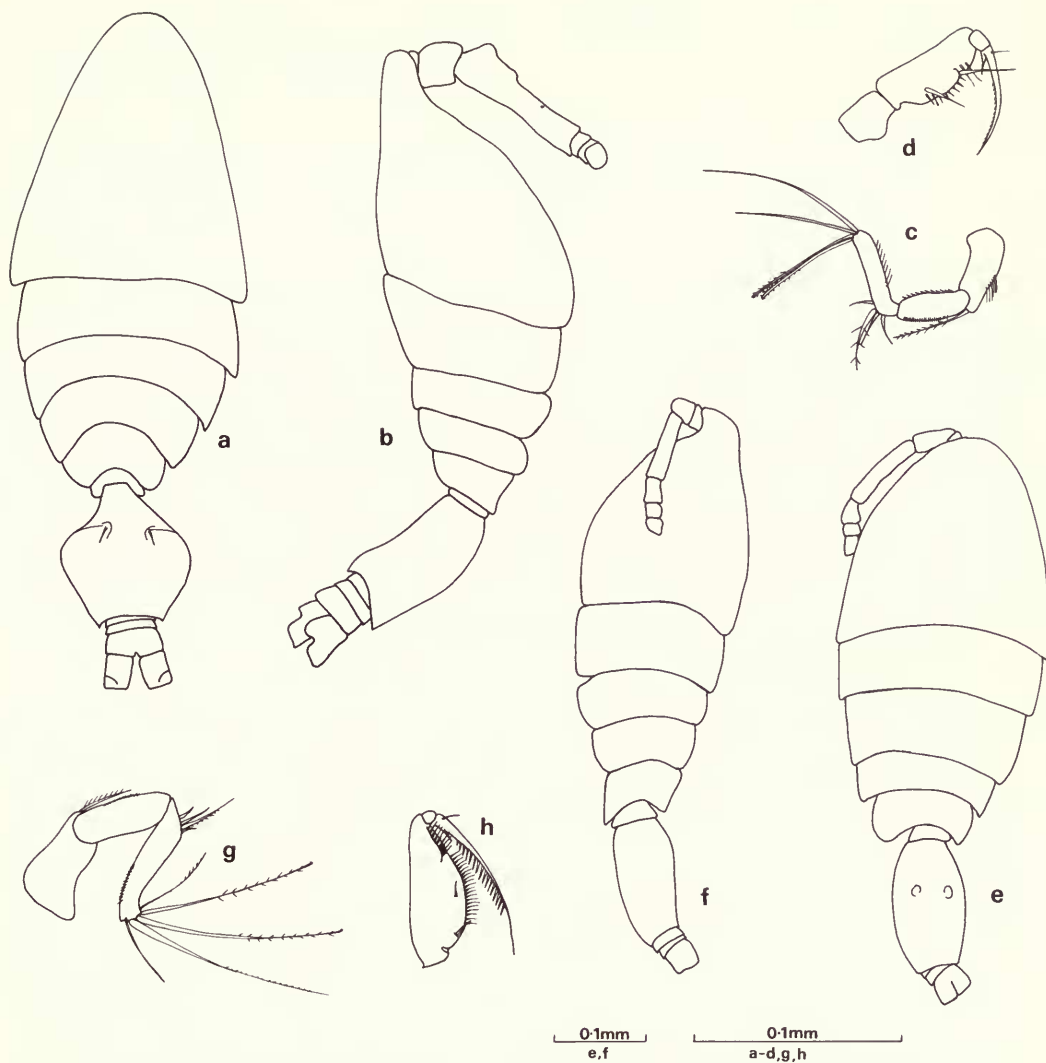


Fig 11 *Oncaea schmitti*. a. female, dorsal; b. female, lateral; c. second antenna; d. maxilliped; *Oncaea umbonata*. e. female, dorsal; f. female, lateral; g. second antenna; h. maxilliped.